That which is claimed is:

1. A rotary machine comprising:

a housing with spaced apart end walls for defining a chamber;

a two-lobe elliptical or lenticular rotor assembly having curved faces meeting at symmetrically opposed apices, said rotor assembly having two parallel end faces extending between said curved faces, each of said parallel end faces facing one of said end walls, said rotor assembly disposed in said chamber for eccentric rotation therein, said rotor assembly further having an even number of eight or more straight cam surfaces in at least one of said parallel end faces arranged about a center of said rotor assembly, each of said straight cams defining an edge ending at a distance from said rotor center;

a rotor guide assembly extending from at least one of said end walls, said rotor guide assembly including four or more arc cams, each of said four or more arc cams being cylindrical in shape over a portion thereof, each of said four or more arc cams having a radius R_p over said portion, each of said four or more arc cams extending through at least one of said parallel end faces having said straight cams, said four or more arc cams engaging said straight cams during said eccentric rotation of said rotor assembly, each of said arc cams having a center longitudinal axis;

a shaft having a center longitudinal axis, said center longitudinal axis of said shaft being offset from said center of said rotor assembly by an offset distance R_{C1}, said shaft extending through said chamber and rotatably mounted in one or both of said endwalls, said shaft further being centered between said four or more arc cams such that the distance R_{C2} of said center longitudinal axis of said shaft to each of said center longitudinal axis of said four or more arc cams is equal to said offset distance R_{C1}, said shaft including at least one eccentric bearing for forming driving contact between said shaft and said rotor assembly, said eccentric bearing having longitudinal center passing through said center of said rotor assembly;

a point of engagement of each of said arc cams with either of two engaging straight cams of said eight or more straight cams, said point of engagement having distance from said center of said rotor assembly, said point of engagement having rotor assembly position, said rotor assembly position having an angle $(180 - \alpha)$ between said center of said rotor assembly to said arc cam center longitudinal axis

measured from said shaft center longitudinal axis, said point of engagement having said distance from said center of said rotor assembly equal to

$$\sqrt{R_{C1}^2 + R1_{C2}^2 - 2R_{C1}R1_{C2}\cos(180-\alpha) + R_P^2}\ .$$

2. The rotary machine of claim 1 further comprising:

a region adjacent said eight or more straight cams, said region having a minimum radius of simultaneous engagement measured from said center of said rotor assembly, said radius being defined by two adjacent leading arc cams or adjacent trailing arcing cams of said arc cams, said two arc cams having a first in line arc cam and second in line arc cam, said two adjacent arc cams having an angle (χ) between said center longitudinal axis of said two adjacent arc cams measured from said shaft center longitudinal axis, said angle (χ) being the maximum for any two adjacent leading arc cams or trailing arc cams, said angle (χ) being greater than 180 degrees, said minimum radius of simultaneous engagement being said distance of engagement of the said second in line of said two adjacent arc cams and said distance of engagement of said first in line of said two adjacent arc cams when equal, said rotor having position for said minimum radius of simultaneous engagement, said position having angle (180 - α1m) between said center of said rotor assembly to said second in line of two adjacent arc cams center longitudinal axis, measured from said shaft center longitudinal axis, said position having angle (180 - α2m) between said center of said rotor assembly to said first in line of two adjacent arc cams center longitudinal axis, said minimum radius of simultaneous engagement is equal to

$$\sqrt{R_{C1}^2 + R1_{C2}^2 - 2R_{C1}R1_{C2}\cos(180-\alpha 1m) + R_{P1}^2}\ .$$

3. The rotary machine of claim 2 wherein:

said minimum radius of simultaneous engagement is also equal to

$$\sqrt{R_{C1}^2 + R1_{C2}^2 - 2R_{C1}R1_{C2}\cos(180-\alpha 2m) + R_{P2}^2}\ .$$

4. The rotary machine of claim 3 wherein:

said minimum radius of engagement for said arc cams of equal radius is equal to

$$\sqrt{R_{C1}^2 + R1_{C2}^2 - 2R_{C1}R1_{C2}\cos(180 - \tfrac{1}{2}\chi) + R_{P1}^2}\,.$$

5. The rotary machine of claim 4 further comprising:

an edge of said second in line arc cam of said two arc cams of said leading or trailing set of arc cams, said edge containing a contact point between arc cam and straight cam at minimum radius of simultaneous engagement, said edge being a distance R_{smax} from said shaft center longitudinal axis, said distance R_{smax} from shaft longitudinal center is equal to

$$\sqrt{R_{C2}^2 + R_{P1}^2 - 2R_{C2}R_{P1}\cos(90 - \alpha 1m/2)}\,.$$

6. The rotary machine as claimed in Claim 5, further comprising a hole passing through the central portion of the rotor assembly and said parallel end faces;

wherein said shaft extends through said hole and said chamber, and is rotatably mounted in each of said end walls; and

wherein said hole is sized so that a distance between said rotor assembly center longitudinal axis to each of said two edges for each of said open ends of said slots is less than a minimum radius of simultaneous engagement equal to

$$\sqrt{R_{C1}^2 + R_{C2}^2 - 2R_{C1}R_{C2}\cos(180 - \alpha 1m) + R_{P1}^2}\,.$$

7. The rotary machine of claim 6 wherein:

the maximum radius of said shaft is less than

$$\sqrt{R_{C2}^2 + R_{P1}^2 - 2R_{C2}R_{P1}\cos(90 - \alpha 1m/2)}\,.$$

8. The rotary machine as claimed in Claim 7, further comprising a cutout portion in said shaft to provide clearance for said shaft to extend through the hole in said rotor assembly.

9. The rotary machine as claimed in Claim 7, wherein said arc cams are shaped to provide rotational clearance for said shaft.

10. The rotary machine as claimed in Claim 7, wherein said arc cams are generally cylindrical in shape.

11. The rotary machine as claimed in Claim 7, wherein said shaft is cylindrical in shape except for a portion adjacent said eccentric bearing.

12. The rotary machine as claimed in Claim 7, wherein said arc cams are cylindrical bearings.

13. The rotary machine as claimed in Claim 12, wherein each of said cylindrical bearings include two or more rollers longitudinally aligned and mounted on a roller shaft.

14. A rotary machine comprising:

a housing with spaced apart end walls for defining a chamber;

a two-lobe elliptical or lenticular rotor assembly having curved faces meeting at symmetrically opposed apices, said rotor assembly having two parallel end faces extending between said curved faces, each of said parallel end faces facing one of said end walls, said rotor assembly disposed in said chamber for eccentric rotation therein, said rotor assembly further having an even number of twelve or more straight cam surfaces in at least one of said parallel end faces arranged about a center of said rotor assembly, each of said straight cams defining an edge ending at a distance from said rotor center;

a rotor guide assembly extending from at least one of said end walls, said rotor guide assembly including six or more arc cams, each of said six or more arc cams being cylindrical in shape over a portion thereof, each of said six or more arc cams having a radius R_p over said portion, each of said six or more arc cams extending through at least one of said parallel end faces having said straight cams, said six or more arc cams engaging said straight cams during said eccentric rotation of said rotor assembly, each of said arc cams having a center longitudinal axis;

a shaft having a center longitudinal axis, said center longitudinal axis of said shaft being offset from said center of said rotor assembly by an offset distance R_{C1}, said shaft extending through said chamber and rotatably mounted in one or both of said endwalls, said shaft further being centered between said six or more arc cams such that the distance R_{C2} of said center longitudinal axis of said shaft to each of said center longitudinal axis of said six or more arc cams is equal to said offset distance R_{C1}, said shaft including at least one eccentric bearing for forming driving contact between said shaft and said rotor assembly, said eccentric bearing having longitudinal center passing through said center of said rotor assembly;

a point of engagement of each of said arc cams with either of two engaging straight cams of said twelve or more straight cams, said point of engagement having distance from said center of said rotor assembly, said point of engagement having rotor assembly position, said rotor assembly position having an angle ($180 - \alpha$) between said center of said rotor assembly to said arc cam center longitudinal axis measured from said shaft center longitudinal axis center, said point of engagement having said distance from said center of said rotor assembly equal to

$$\sqrt{R_{C1}^2 + R1_{C2}^2 - 2R_{C1}R1_{C2}\cos(180-\alpha) + R_P^2}\ .$$

15. The rotary machine of claim 14 further comprising:

a region adjacent an area of said twelve or more straight cams, said region having a minimum radius of simultaneous engagement measured from said center of said rotor assembly, said radius being defined by two adjacent leading arc cams or adjacent trailing arc cams of said arc cams, said two arc cams having a first in line arc cam and second in line arc cam, said two adjacent arc cams having an angle (χ) between said center longitudinal axis of said two adjacent arc cams measured from said shaft center longitudinal axis, said angle (χ) being the maximum for any two adjacent leading arc cams or trailing arc cams, said angle (□) being less than 180 degrees, said minimum radius of simultaneous engagement being said distance of engagement of the said second in line of said two adjacent arc cams and said distance of engagement of said first in line of said two adjacent arc cams when equal, said rotor having position for said minimum radius of simultaneous engagement, said position having angle ($180 - \alpha 1m$) between said center of said rotor assembly to said

second in line of two adjacent arc cams center longitudinal axis measured from said shaft center longitudinal axis, said position having angle ($180 - \alpha 2m$) between said center of said rotor assembly to said first in line of two adjacent arc cams center longitudinal axis, said minimum radius of simultaneous engagement is equal to

$$\sqrt{R_{C1}^2 + R1_{C2}^2 - 2R_{C1}R1_{C2}\cos(180 - \alpha 1m) + R_{P1}^2} \quad .$$

16. The rotary machine of claim 15 wherein:

said minimum radius of simultaneous engagement is also equal to

$$\sqrt{R_{C1}^2 + R1_{C2}^2 - 2R_{C1}R1_{C2}\cos(180 - \alpha 2m) + R_{P2}^2} \; .$$

17. The rotary machine of claim 16 wherein:

said minimum radius of engagement for said arc cams of equal radius is equal to

$$\sqrt{R_{C1}^2 + R1_{C2}^2 - 2R_{C1}R1_{C2}\cos(180 - \tfrac{1}{2}\chi) + R_{P1}^2} \; .$$

18. The rotary machine of claim 17 further comprising:

an edge of said second in line arc cam of said two arc cams of said leading or trailing set of arc cams, said edge containing a contact point between arc cam and straight cam at minimum radius of simultaneous engagement, said edge being a distance R_{smax} from said shaft center longitudinal axis, said distance R_{smax} from shaft longitudinal center is equal to

$$\sqrt{R_{C2}^2 + R_{P1}^2 - 2R_{C2}R_{P1}\cos(90 - \alpha 1m/2)} \quad .$$

19. The rotary machine as claimed in Claim 18, with said hole passing through the central portion of the rotor assembly and said parallel end faces;

wherein said shaft extends through said hole and said chamber, and is rotatably mounted in each of said end walls; and

wherein said hole is sized so that a distance between said rotor assembly center longitudinal axis to each of said two edges for each of said open ends of said slots is less than said minimum radius of simultaneous engagement equal to

$$\sqrt{R_{C1}^2 + R_{C2}^2 - 2R_{C1}R_{C2}\cos(180 - \alpha 1m) + R_{P1}^2}$$

and the maximum radius of said shaft is less than

$$\sqrt{R_{C2}^2 + R_{P1}^2 - 2R_{C2}R_{P1}\cos(90 - \alpha 1m/2)}\,.$$

20. The rotary machine as claimed in Claim 19, further comprising a cutout portion in said shaft to provide clearance for said shaft to extend through the hole in said rotor assembly.

21. The rotary machine as claimed in Claim 19, wherein said arc cams are shaped to provide rotational clearance for said shaft.

22. The rotary machine as claimed in Claim 19, wherein said arc cams are generally cylindrical in shape.

23. The rotary machine as claimed in Claim 19, wherein said shaft is cylindrical in shape except for a portion adjacent said eccentric bearing.

24. The rotary machine as claimed in Claim 19, wherein said arc cams are cylindrical bearings.

25. The rotary machine as claimed in Claim 24, wherein each of said cylindrical bearings include two or more rollers longitudinally aligned and mounted on a roller shaft.